

# **ASSESSMENT OF THE KANSAS FOODBORNE ILLNESS COMPLAINT SYSTEM AND THE RESTAURANTS ASSOCIATED, 2009-2014**

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**ABSTRACT**

The state agencies of Kansas utilize many different channels of disease reporting and disease detection. Foodborne illness oftentimes goes undetected and a foodborne illness complaint system is a method that puts the ill persons directly in contact with health administration professionals. Complaint systems can decrease the barriers between disease reporting and epidemiologists and can be more rapidly assessed than other methods of surveillance. Analysis of these complaints provides policymakers and health professionals with more complete data on which to base decisions and actions.

The goal of this field experience and capstone project with the Kansas Department of Health and Environment (the KDHE) was to analyze the Kansas Department of Agriculture's foodborne illness complaint system, utilizing data from Kansas Food Establishment (KFE) complaints, and the KDHE's foodborne outbreak investigation data for the period 2009 to 2014. All data was cleaned and compiled into singular files and assessed with SAS and Excel. Count data were assessed and KFE variables were analyzed for contributing factors in complaint submissions. KFE variables (Risk Assessment Code, Principal Food Type, and Franchise Status) all served as contributors to the probability that a KFE will be investigated, but there were no significant contributions to the probability of an outbreak investigation. Complaint variables (Anonymity and Complaint Submission Method) were assessed for an association with a complaint being investigated with anonymity being a significant contributor. Complaint submission method was then found to be a significant contributor to the probability of a complainant submitting a complaint anonymously.

Steps taken to increase telephone complaints and non-anonymous complaints could potentially increase the number of detected outbreaks in Kansas and give health professionals a better picture of the impact of foodborne illness on Kansas.

***SUBJECT KEYWORDS: KANSAS, FOODBORNE, COMPLAINT, THE KDHE, THE KDA, ILLNESS***

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## CH. 1- INTRODUCTION

### FIELD EXPERIENCE OVERVIEW

On May 28<sup>th</sup>, I started an internship with the Kansas Department of Health and Environment (the KDHE) in Topeka, Kansas. The internship was facilitated through Daniel Neises, Senior Epidemiologist, within the Bureau of Epidemiology and Public Health Informatics (BEPHI). The internship involved a minimum of 240 contact hours in the department between May 28<sup>th</sup> and August 11<sup>th</sup>, 2015.

During the internship, I was active in my main project on the assessment of the foodborne illness complaint and outbreak data sets. This project took the majority of my time, but I was also privy to some side projects. I took part in food history telephone surveys for outbreak investigation and also different food illness questionnaires. A side project that stands apart from the others is a day-trip to Mound City, Kansas with a state epidemiologist to assist the CDC in tick collection. Ticks were to be tested for presence of Heartland and Bourbon virus. The internship at the KDHE allowed me a look into many different types of projects and experiences.

### KDHE AND BEPHI

The Kansas Department of Health and Environment is a state-level department functioning in numerous roles revolving around their mission statement, “To protect and improve the health and environment of all Kansans.” (10) Directed by Dr. Susan Mosier, the KDHE oversees environmental health, reportable diseases, vital statistics, and many other duties. The specific department I will focus on in this report is the Bureau of Epidemiology and Public Health Informatics, or BEPHI.

BEPHI, functioning under state epidemiologist D. Charles Hunt, states a purpose of “...collecting, analyzing, and interpreting data that provide information on a variety of conditions of public health importance and on the health status of the population.”(2) BEPHI is divided into five departments; however, many employees bridge between divisions and each contribute to the efforts of the other. These five divisions are the Office of Vital Statistics, Environmental Public Health Tracking Program, Health and Vital Statistics Analysis, Infectious Disease Epidemiology and Response, and Infectious Disease Surveillance. My internship was with the Infectious Disease Epidemiology and Response and Infectious Disease Surveillance departments. A diagram of the organizational layout of the KDHE is included in the appendix.

### KDA

The Kansas Department of Agriculture (KDA) is another state-level department responsible for supporting the entire Kansas agriculture sector. This includes “...farmers, ranchers, food establishments, and agribusinesses.”(7) Due to the KDA’s collection and storage of data on food establishments in Kansas, I was in contact with the department to procure datasets when needed. The particular department this research references is the division of Agricultural Business and Services, Food Safety and Lodging. Food Safety and Lodging regulates production, sale, and investigation of food products in



Kansas. The KDA keeps careful track of the extensive food distribution and retail system in Kansas and maintains the efficiency and safety of these systems.

## FOODBORNE ILLNESS

Yearly, approximately 1 in 6 Americans will develop a foodborne illness (3). This puts an enormous strain on the health system and economy of the United States; foodborne illness costs the United States \$365 million in medical costs annually (3). 128,000 persons will require hospitalization and 3,000 of these cases will be fatal (3). Foodborne disease can be caused by numerous etiological agents such as viruses, bacteria, parasites, toxins, or rarely chemical contamination. Most pathogen contamination occurs during food preparation, either by equipment vectors or the people involved in preparation (11). The chart below, **Table 1**, shows the estimated number of illnesses attributed to each of the top five foodborne pathogens in the United States accounting for an estimated 91% of all foodborne disease (1). These figures are estimates due to the fact that over half of the reported foodborne disease outbreaks cannot be traced to an etiological agent (13). Most foodborne infections go undiagnosed and unreported.

<b>Table 1. Predominant Etiological Agents in the United States, 2013 (1)</b>		
<b>Pathogen</b>	<b>Estimated Number of Illnesses</b>	<b>% Food-Related Illness</b>
<b>Norovirus</b>	5,461,731	58
<b><i>Salmonella, nontyphoidal</i></b>	1,027,561	11
<b><i>Clostridium perfringens</i></b>	965,958	10
<b><i>Campylobacter spp.</i></b>	845,024	9
<b><i>Staphylococcus aureus</i></b>	241,148	3
<b>Subtotal</b>		91%

## KANSAS FOODBORNE ESTABLISHMENTS

Between 2009 and 2014, 14,000 total food service establishments held a license with the KDA. These include commonplace establishments such as McDonalds or Applebee's and also very diverse places such as the single restaurant in Kansas serving African cuisine. This license database includes other places of food preparation such as schools, nursing homes, and Masonic Lodges. My following

study limited the 14,000 total licensed establishments to mainly restaurants, excluding any place without public food service and on-site food preparation.

The foodborne illness complaint system in Kansas is administered by the KDA and monitored by the KDA and the KDHE. If a Kansan suspects illness originating from a Kansas food establishment, they can submit a complaint to the KDA and the KDA will perform a food and lodging investigation. The complaint is then copied and the form forwarded to the KDHE where it is assessed and determined if it meets the criteria for investigation, or potential outbreak. Complaints meeting these criteria have 2 or more persons ill and involve 2 or more households. Complaints meeting criteria to be investigated are further assessed by the KDA and also by the KDHE and local health departments by interviewing the ill persons about their symptoms and exposures. The 2<sup>nd</sup> and 3<sup>rd</sup> figures located in the appendix include images of the physical complaint form and the online complaint prompt.

## COMPLAINTS

As previously stated, Kansas's foodborne illness complaint system is managed by the KDA's Department of Food Safety and Lodging. When suspecting foodborne illness, a complaint can be filed many ways, but the main methods are telephone and online methods. The complaint form asks for the complainant's contact information, the date and time of exposure, the name and location of the establishment suspected, a description of the complaint, symptoms the ill are experiencing, date and time of illness onset, the number of ill persons, the number of persons served, the number of households involved, if medical treatment was pursued, and a brief food history. The form also includes the option to not provide personal information and remain anonymous. Name and contact information is subject to the Kansas Open Records Act and the KDA makes this clear to the complainant; at the same time, in the case of suspected outbreaks, little can be done to investigate anonymous complaints.

A complaint system is an integral part of a foodborne outbreak surveillance system (11). Other methods of outbreak surveillance involve the afflicted being processed through the medical system and can often involve lag periods between symptom onset and medical practitioner visit, between practitioner visit and diagnosis, and between practitioner visit and laboratory test results. The medical field is also only required to relay information to health departments on reportable diseases. Reportable diseases are diseases under strict surveillance by state and federal departments and all detected instances are required to be reported. Complaint systems shorten this flow of reporting and are often more rapid than these other methods of surveillance. Complaints remove the diagnosis requirement completely and include many non-reportable diseases that are common causes of foodborne illness outbreaks. This can come at the cost of losing some specificity and further analysis must be performed, but other methods of foodborne illness detection fill in this gap such as laboratory results or physician diagnostics in specificity. If a person becomes ill and does not seek medical advice or is not diagnosed, complaints are one of the only other ways health departments know about the illness incident.

## OUTBREAK INVESTIGATIONS

Investigation of a complaint occurs when the outbreak definition is met. When a complaint is submitted involving two or more households, the KDHE begins an investigation. The epidemiologists reviewing the complaints at the KDHE: BEPHI also look for key factors in complaints that may not meet the outbreak definition, but show alarming qualities such as potential toxin contamination or violent symptoms, or that show an exposure date or location related to another separate complaint. Investigations involve testing food samples, comparing cases, reviewing food history, and many other factors. Epidemiologists use what information the complaint provides to look for specific pathogens, contact the complainants and find other cases.

Once a complaint is investigated to the fullest, the investigation is labeled as either a confirmed outbreak or not an outbreak. While there is some variability in the “Not an Outbreak” label, “Confirmed Outbreaks” are investigations that have been confirmed as an outbreak of foodborne illness, even if a specific pathogen can’t be determined. Not an outbreak could mean there actually was no outbreak, but it could also mean different situational things. For instance, if the complainant remained anonymous but the complaint met the outbreak criteria, the KDHE is not able to investigate with no real way to contact the complainant; this inability to reach the complainants would be labeled as “Not an Outbreak”. Another common example of an investigation being labeled as not an outbreak would be in cases where there simply isn’t enough information or too many commonalities in the food history to pinpoint a particular source. Completeness and accuracy of the complaint form, along with contact information, are the key products of a complaint system to ensure the KDHE can appropriately investigate.

## DEFINITIONS SPECIFIC TO THIS RESEARCH

- **Outbreak Criteria for Investigation:** Two or more individuals from different households who experience a similar illness after eating a common food or different food from a common place
- **Ready-To-Eat Food:** Food or drink products prepared on-site at the establishment and purchased in an edible state without needing preparation by the consumer.<sup>1</sup>
- **Franchise Status:** For the purpose of this research, a “chain establishment” is defined as 3 or more establishments registered in Kansas<sup>2</sup>
- **Anonymity:** Anonymous denotes a complainant’s desire to remain anonymous and not provide identifying information on the complaint form
- **Complainant:** The person or entity submitting the complaint

- **Risk Assessment Code (RAC):** A number one through six assigned to a KFE denoting the relative risk of foodborne illness with 1 being the lowest risk and 6 being the highest; this is used to determine the frequency of periodic establishment inspection (See Table 2. below).
  - The RAC determines the frequency of regular KFE inspections per year by the KDA

Table 2. Risk Assessment Code Overview							
RAC	Basic Description	Potentially Hazardous Foods (PHF's)	Cold/Hot Holding	Food Preparation	Cooking on Site	Ware Washing	Reheating/Cooling
#6	Advanced Prep	Yes	Cold and/or Hot	Extensive	Yes	Yes	Yes
#5	Cook and Serve	Yes	Cold and/or Hot	Simple	Yes	Yes	None
#4	Deli's, Satellite Food Service	Yes	Cold Only	Limited	None	Yes	None
#3	PHF's can be served- Satellite	Yes	Cold and/or Hot	None	None	Yes	None
#2	May have PHF's, but no prep on site	Yes	Cold Only	None	None	None	None
#1	Food in Original container	No	Neither	None	None	None	None

## PROJECT OBJECTIVES

The goals of my internship are described below as laid out by preceptor, Daniel Neises.

Perform an analysis of restaurant-associated foodborne illness complaints in Kansas from 2009-2014. Compare the characteristics of these complaints and evaluate which complaints are more likely to result in a confirmed foodborne illness outbreak. Determine if complaints or outbreaks are associated with restaurant size or RAC level.

- Merging and Cleaning data sets from the KDHE and the KDA
- Descriptive analysis of foodborne complaints and foodborne outbreak data

- Statistical significance tests for comparing restaurant or complaint characteristics to outbreak status
- Participation in outbreak investigation, if an outbreak occurs during the field experience and time allows
- Formal report summarizing the analysis of the data
- A PowerPoint presentation will also be hosted for the KDHE and the KDA staff

## LEARNING OBJECTIVES

To describe and analyze foodborne illness complaints reported to the Kansas Department of Health and Environment (the KDHE) from the Kansas Department of Agriculture (the KDA). This assessment will provide the experience to work with actual data collected by public health agencies. The foodborne complaint assessment may help the KDHE determine what types of food establishments are the most frequent cause for complaints and outbreaks.

Participation in outbreak investigation, if an outbreak occurs during the field experience and time allows, will provide real world experience of infectious disease epidemiology in public health.

## CH. 2- METHODS

### DATA SOURCES AND CLEANING

The data used in this project were collected by normal activities of the KDA and the KDHE from 2009 to 2014. With the aid of Daniel Neises, the KDHE senior epidemiologist, a request was sent to the KDA for Kansas food establishment licensure records and food establishment complaints during the study time. Outbreak investigation data were gathered from the KDHE databases for the five year period. The databases contained data for approximately 14,000 KFEs, 1,300 complaints, and 350 outbreak investigations.

Each year's data was aligned across each database and compiled into single pages in Microsoft Excel (2010) (Microsoft Corporation, Redmond, Washington). Each of the three sets of data was cleaned as follows:

- removed KFE's not providing "ready-to-eat" food;
- removed complaints not involving suspected foodborne illness;
- removed complaints not involving "ready-to-eat" food;
- removed outbreak investigations not originating from a foodborne illness complaint;
- added food service type, franchise status, and principal food type to each remaining KFE;
- added outbreak investigation Identification number to corresponding complaint.

All concatenating was performed through Statistical Analysis Software (SAS) (2008) (SAS Institute). Complaints were linked to the producing KFE by means of the KDA's license number. Complaints were also linked to their corresponding outbreak investigation by adding the outbreak investigation identification number.

### ANALYSIS

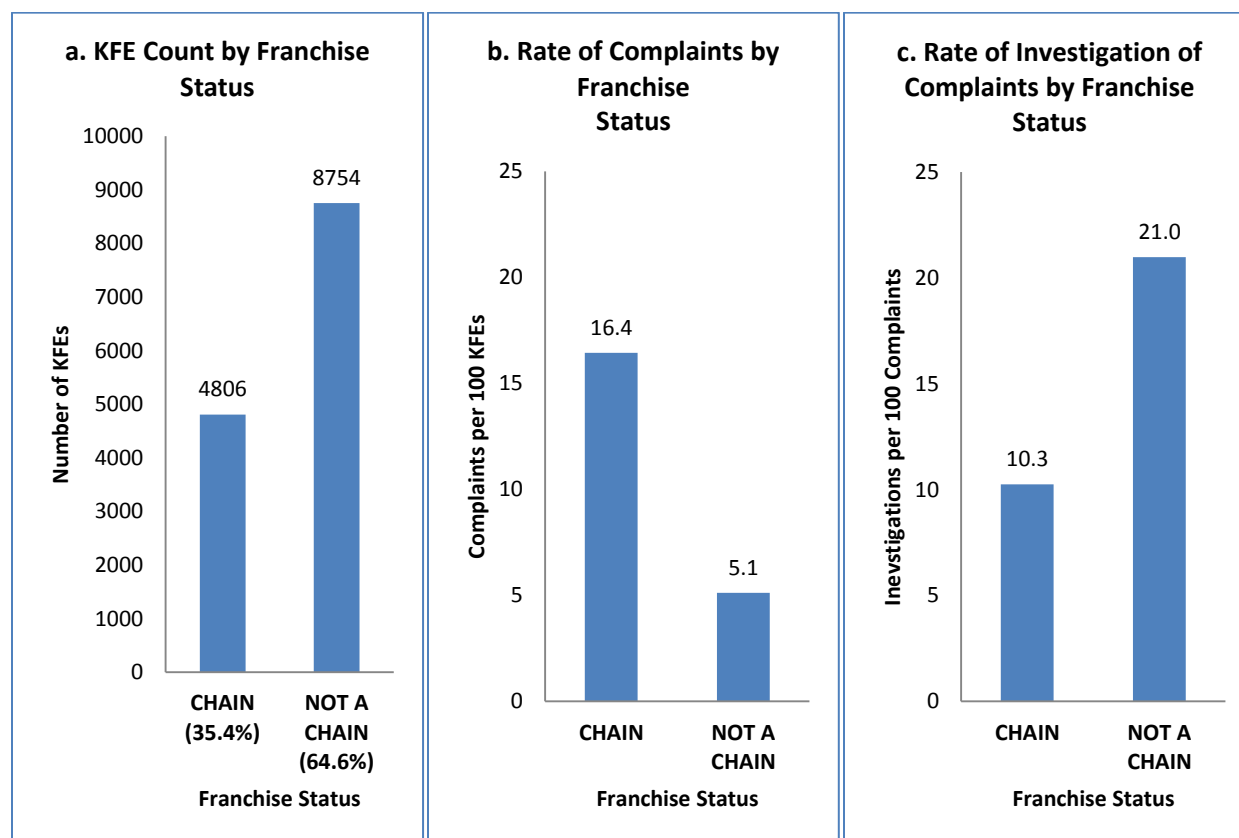
SAS and Excel were used to compile the count data for each variable. Using SAS, KFE variables on food service type, RAC, franchise status, and principal food type were tested for univariate effects on a complaint being submitted with chi-square tests. Chi-square tests were also used to assess complaints linked to KFE factors using SAS to test for association with the outcome of a complaint being investigated. Finally, the anonymity variable was assessed for contribution to confirmation of an outbreak from an investigation. Due to all variable data being discrete, logistic regression modeling was used to examine conditional effects, interactions, and contribution to each model by step-wise inclusion.

## CH. 3- RESULTS

### KFE: FRANCHISE STATUS

Each of the studied variables in the KFE data lines was counted through SAS. The distribution of the KFE, complaint, and outbreak investigation is represented below. **Figure 1a** shows the overview of KFEs by franchise status holding a license between 2009 and 2014. Non-chain KFEs represent approximately double the number of chain KFEs (64.6%). The total number of complaints by franchise status (**Figure 1b**) shows that while chain KFEs only account for 35% of all KFEs, they produce complaints at approximately triple the volume compared to non-chains. **Figure 1c** shows the proportion of outbreak investigations of a complaint for each franchise status per 100 complaints. Regardless of the increased incidence of complaints against chain establishments, non-chain establishment complaints produced double the outbreak investigations for every 100 complaints submitted.

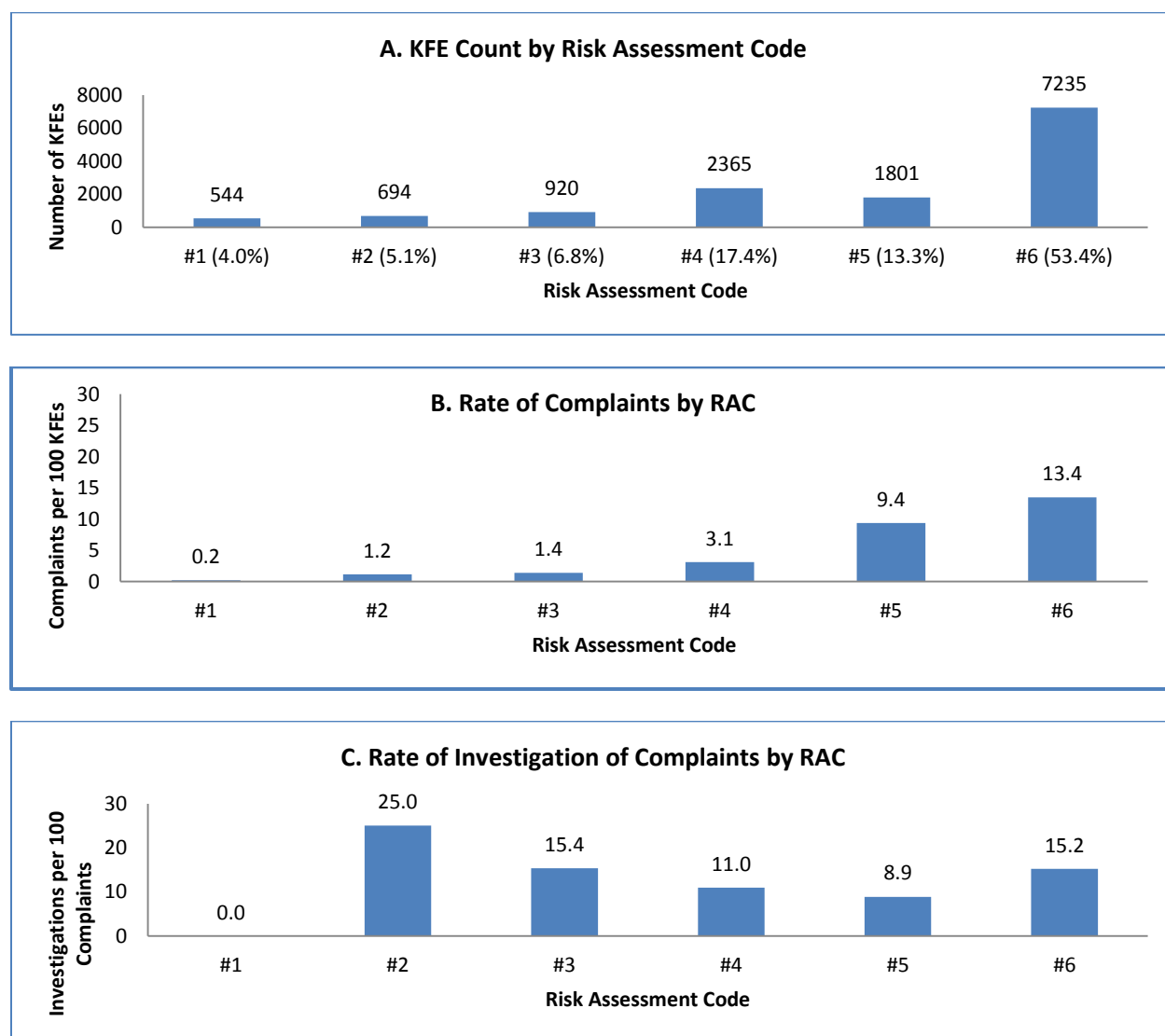
Figure 1 a-c: KFEs, Complaints and Investigations by Franchise Status, Kansas, 2009-2014



## KFE: RAC

Descriptive analysis of the categorical variable, Risk Assessment Code (RAC), is displayed below. The number of KFEs per RAC shows a majority of KFEs falling under risk assessment code 6, with the next two largest groups being RAC 4 and 5 (**Figure 2a**). The demarcation between these three and the lower three continues as the focus progresses to the KFE complaints by RAC per 100 KFEs (**Figure 2b**) with RAC 6 accounting for the highest rate of foodborne illness complaint incidents between 2009 and 2014. Due to the large number of establishments falling under RAC 6, this category produces the highest number of total complaints, but when adjusting the investigations in **Figure 2c** to represent the number of outbreak investigations by RAC per 100 complaints, a fairly random distribution of rates is shown and the higher risk establishments (RAC 3, 4, 5) do not show a higher rate of investigation of complaints.

**Figure 2 a-c: KFEs, Complaints and Investigations by Risk Assessment Code, Kansas, 2009-2014**

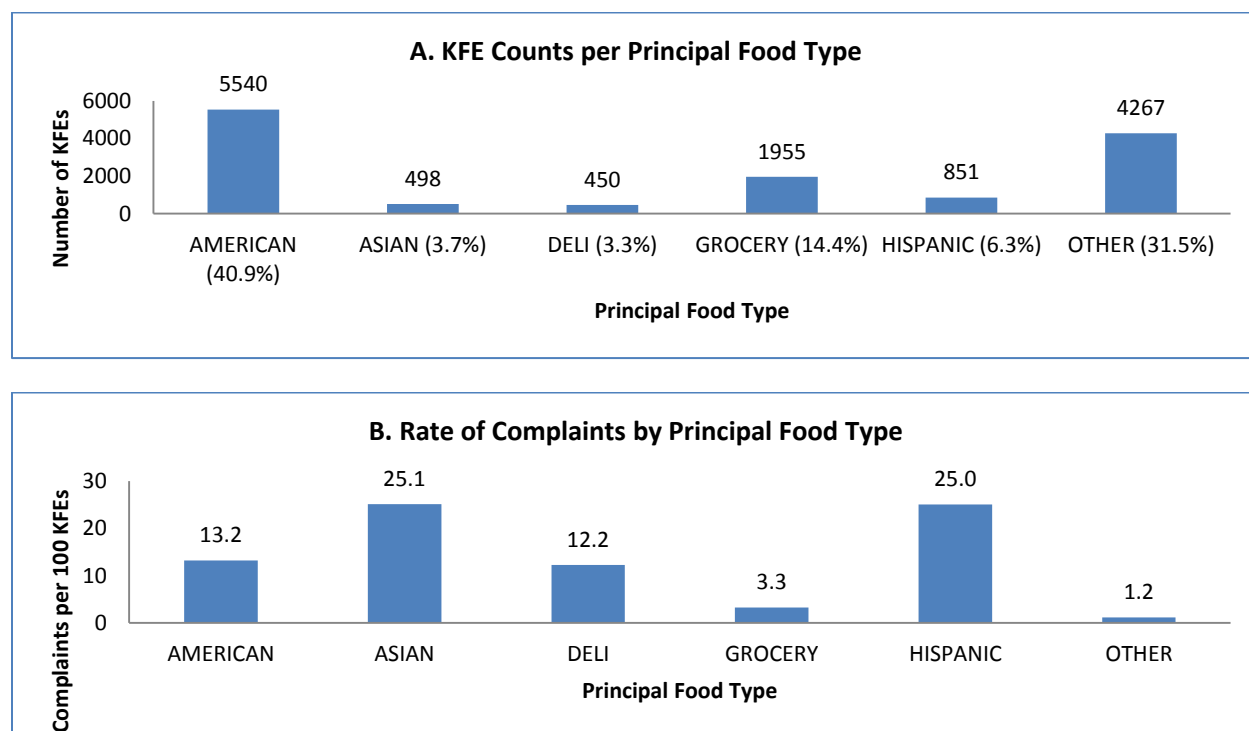


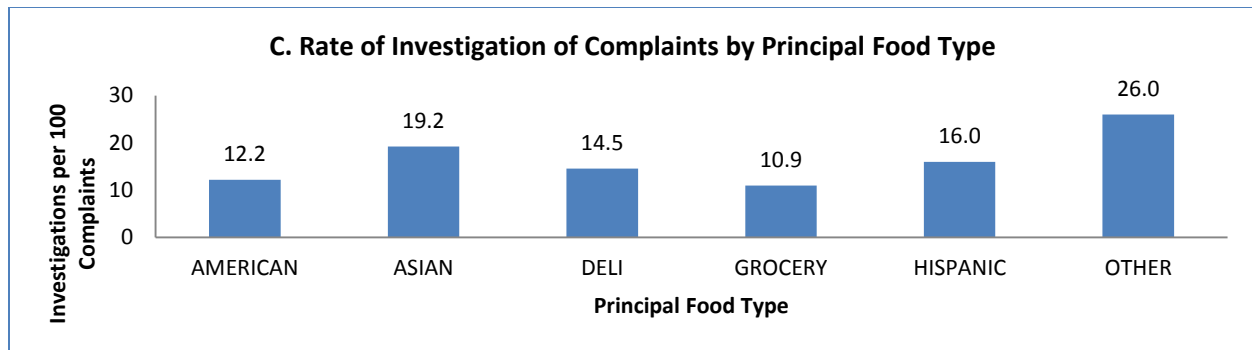


## KFE: PRINCIPAL FOOD TYPE

All KFEs were sorted into appropriate principal food type based on their predominant food served. American food-serving KFEs along with the “Other” category held the most KFEs with 41% and 32%, respectively (**Figure 3a**). Grocery KFEs come in at 14% with Asian, Deli, and Hispanic KFEs between 3% and 7% of all food establishments in Kansas. **Figure 3b** shows the foodborne illness complaints distributed among these categories and adjusted to complaints per 100 KFEs. American food, while the largest group of KFEs, produced complaints at half the incidence of Asian and Hispanic establishments. Finally, **Figure 3c**, displays the investigations originating from each complaint across the food type served in the investigations per 100 complaints submitted. While there was a marked difference in complaints per 100 KFEs when stratified by principal food type, investigations of these complaints don’t follow the patterns one would expect from the previous figures.

**Figure 3 a-c: KFEs, Complaints and Investigations by Principal Food Type, Kansas, 2009-2014**





## COUNTY COUNTS

**Figure 4 a-c**, below, show the number of KFEs, complaints, and outbreak investigations per county. There is an obvious increase in the number of all three around the major population centers of Kansas in Sedgwick, Shawnee, Douglas, Johnson, and Wyandotte counties and a significantly fewer number of all three factors in the more rural western Kansas counties. **Figure 4d** displays Kansas's population count category for each county according to the 2010 national census.

Figure 4a: Density of Kansas Food Establishments per County, 2009-2014

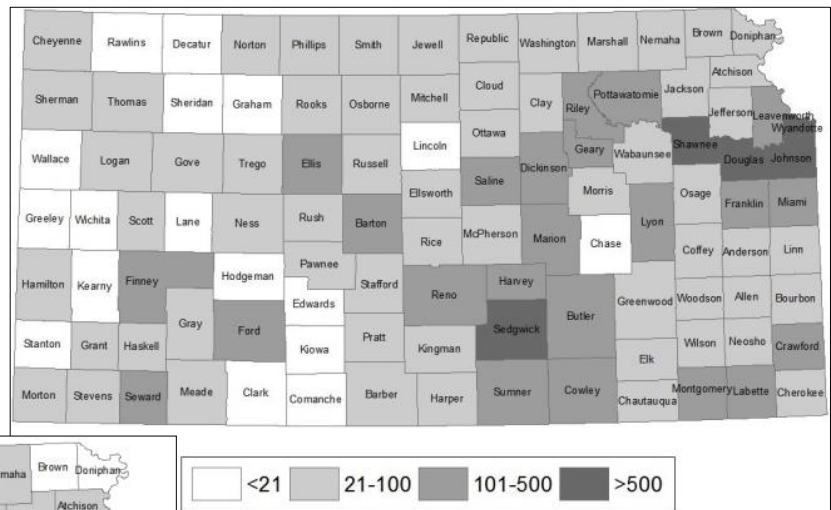


Figure 4b: Density of Complaints per County, 2009-2014

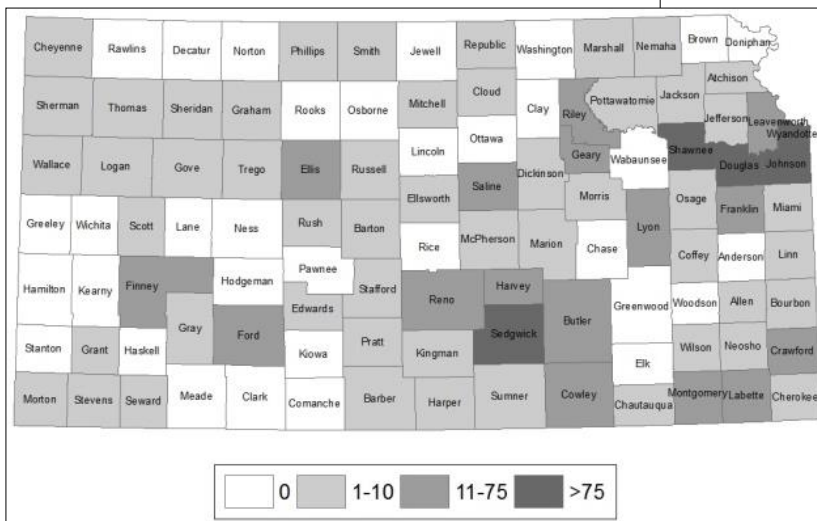
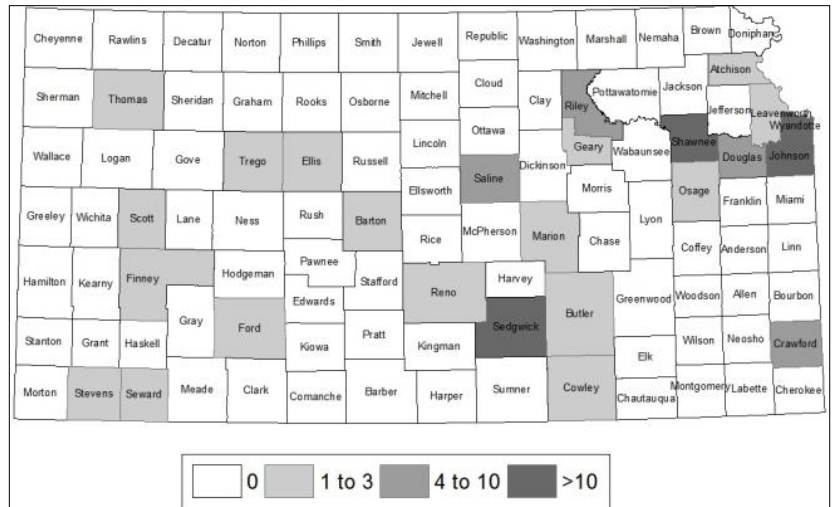
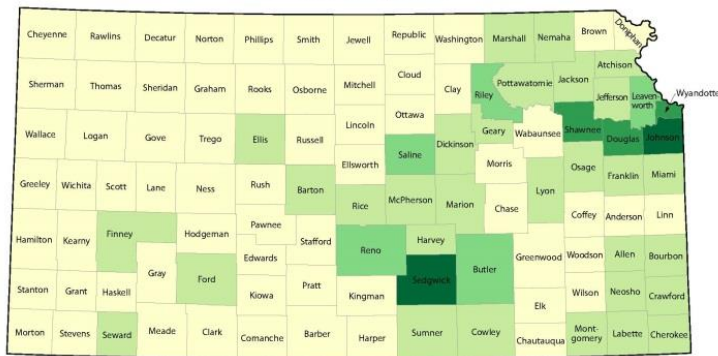


Figure 4c: Density of Outbreak Investigations per County, 2009-2014



KANSAS - 2010 Census Results  
Total Population by County



Number of People  
 200,000 to 544,179  
 100,000 to 99,999  
 50,000 to 99,999  
 10,000 to 49,999  
 1,247 to 9,999  
 Total State Population: 2,833,118

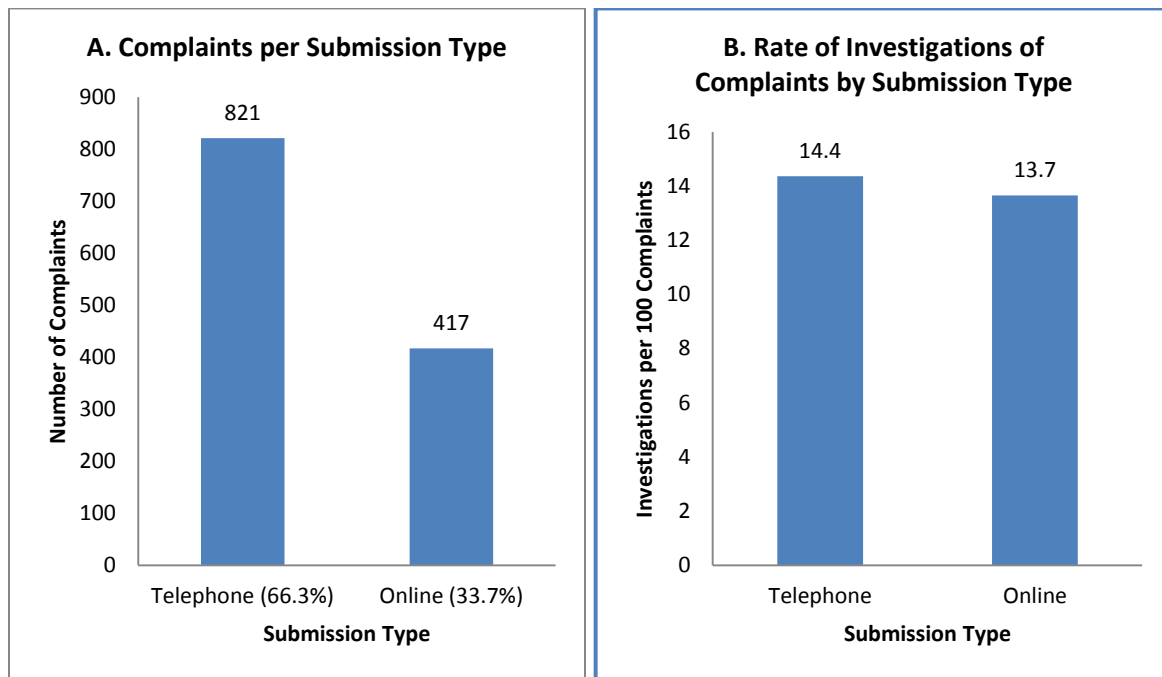
United States  
Census  
Bureau

Figure 4d: Density of Kansas Citizens per  
County, 2010

## COMPLAINTS AND INVESTIGATIONS: SUBMISSION METHOD

Complaint and outbreak investigation data are displayed below stratified by the method of complaint submission. **Figure 5a** below shows that over the past 5 years nearly double the numbers of complaints have been submitted by telephone than by online methods of submission. **Figure 5b** demonstrates a relatively even frequency of investigations per 100 complaints for each complaint submission method with about 14% of the complaints meeting potential outbreak criteria.

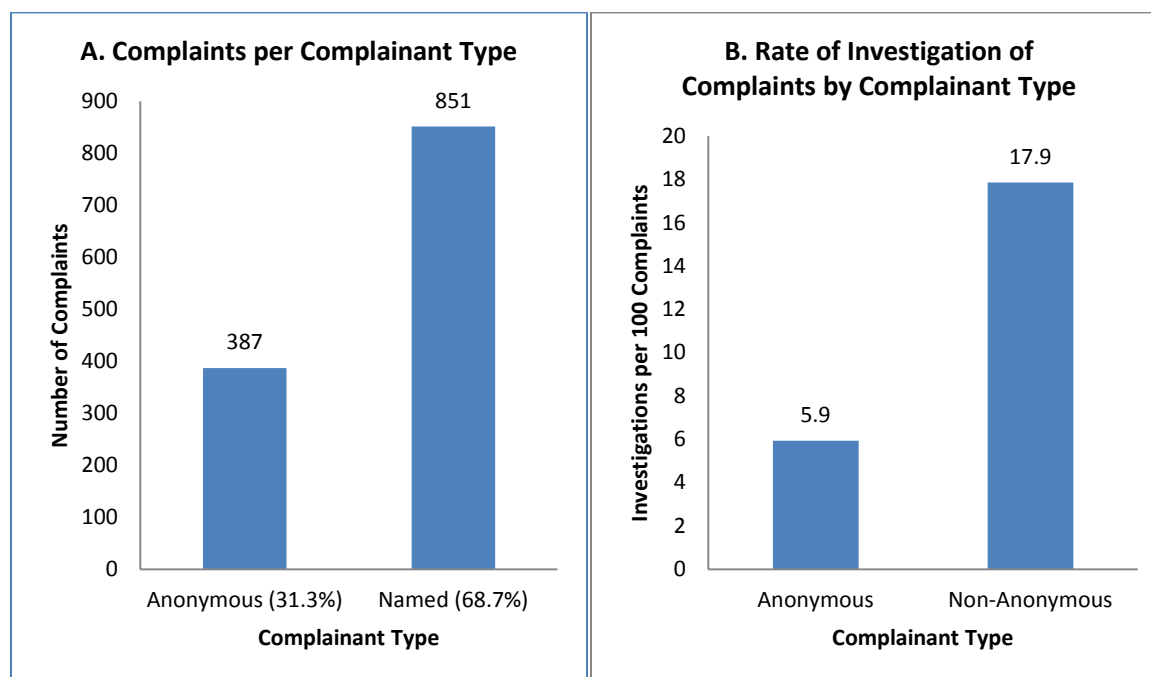
**Figure 5 a & b: Complaints and Investigations by Complaint Submission Type, Kansas, 2009-2014**



#### COMPLAINTS AND INVESTIGATIONS: ANONYMITY

The charts below display the frequency of a complainant either requesting to be anonymous or providing identifying information. **Figure 6a** shows that non-anonymous complaints with identifying information are submitted at over double the frequency of non-anonymous complaints. The gap between these two complainant types is widened when moved into the outbreak investigation phase, **Figure 6b**, where the percentage of non-anonymous complaints that meet the investigation criteria is three-fold more than the anonymous.

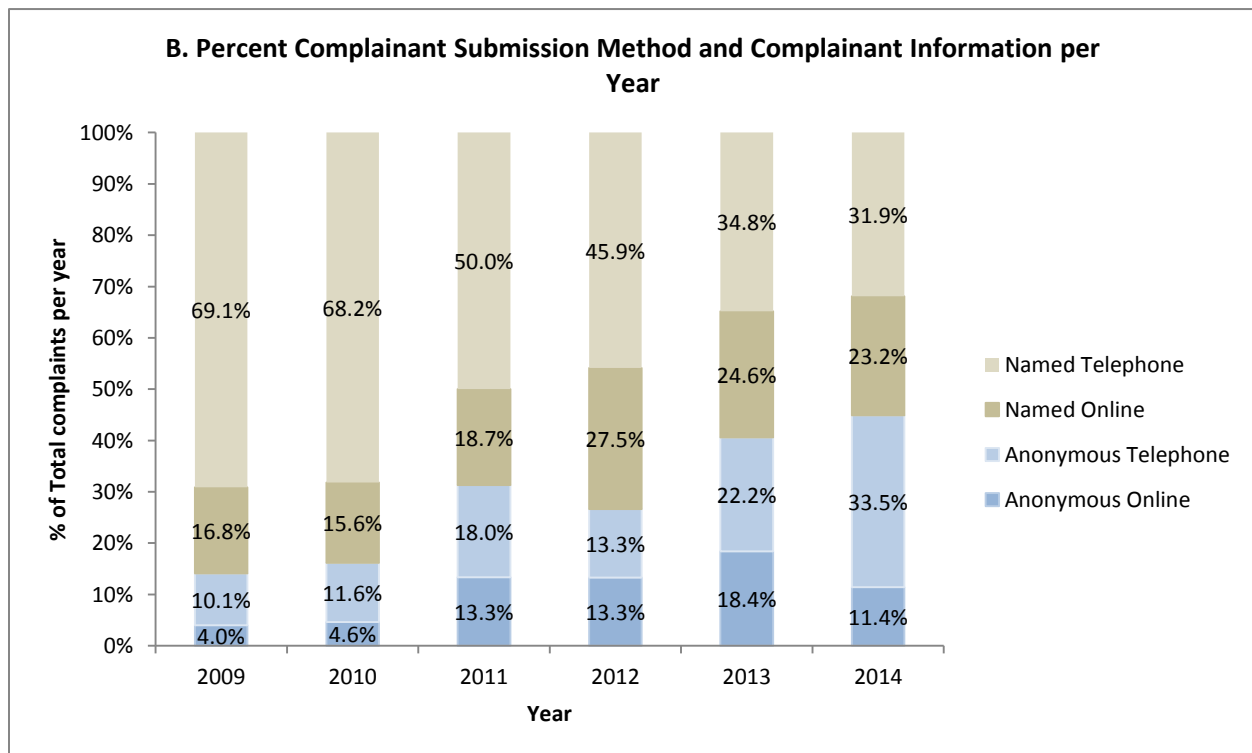
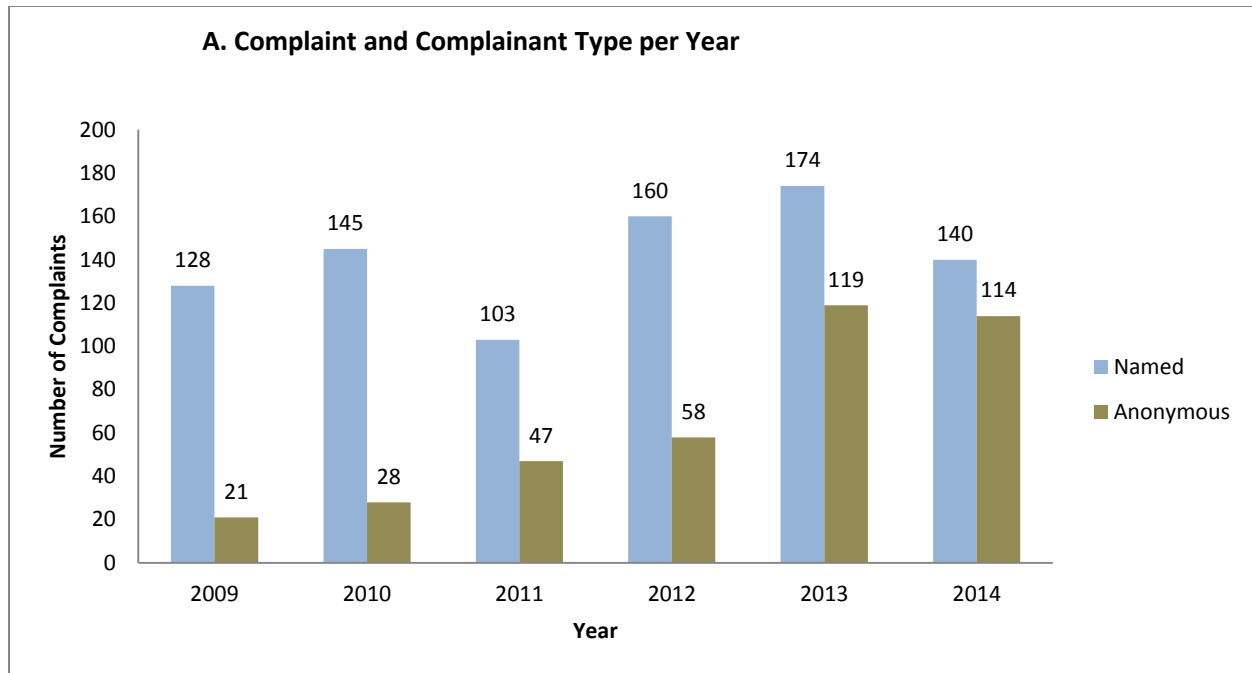
**Figure 6 a & b: Complaints and Investigations by Complainant Information, Kansas, 2009-2014**



### COMPLAINTS AND INVESTIGATIONS: YEAR SUBMITTED

The following charts track the trend in complaints and outbreak investigations. **Figure 7a** shows the gradual increase in yearly foodborne illness complaints between 2009 and 2014. It also shows the frequency of non-anonymous and anonymous complaints increasing with anonymous complaints accounting for the majority of increase in yearly complaints. **Figure 7b** shows that 2009's anonymous complaints were only 12% of the total complaints compared to 2014's percent anonymous complaints topping out at 45%. There is also a gradual increase in the percentage of complaints submitted by online methods.

**Figure 7 a & b: Complaints and Investigations by Complainant Information and Submission Methods, Kansas, 2009-2014**



## ANALYSIS: KFE FACTORS AND COMPLAINTS

**Table 3** reports the odds of producing a complaint for measured KFE factors. All risk assessment codes were compared against RAC 4 due to this being the level that food preparation begins on site. RAC 1, 2, and 3 showed a significant decrease in the odds of producing a complaint when compared to RAC 4. RAC 5 and 6 showed a significant increase in odds ratio with RAC 5 3.25 times the likelihood of producing a complaint and RAC 6 4.88 times as likely of producing a complaint when each is compared to RAC 4. Franchise status shows that chain KFE's are 3.7 times more likely to produce a complaint than their non-chain counterparts in Kansas. When determining the odds ratios for principal food type, food categories were compared to American food due to American food being the most popular and providing the best baseline of complaint incidence. Delis showed a similar complaint OR to American food and the grocery and "other" categories showed decreased risk of producing a complaint compared to American food. The Asian and Hispanic food categories were approximately 2.2 times as likely to produce a complaint compared to American KFEs.

<b>Table 3. KFE FACTORS ASSOCIATED WITH A COMPLAINT, KANSAS, 2009-2014</b>			
<b>RISK ASSESSMENT CODE</b>	<b>Odds Ratio</b>	<b>95% Confidence Limits</b>	
RAC 1 vs. 4	0.06	0.00	0.26
RAC 2 vs. 4	0.37	0.16	0.72
RAC 3 vs. 4	0.45	0.24	0.79
RAC 5 vs. 4	3.25	2.46	4.33
RAC 6 vs. 4	4.88	3.86	6.28
<b>FRANCHISE STATUS</b>			
Chain vs. Non-Chain	3.647	3.23	4.12
<b>PRINCIPAL FOOD TYPE</b>			
Asian vs. American	2.205	1.77	2.73





Asian vs. American	101	(10)	24	(14)	0.58	0.35	0.95
Deli vs. American	47	(4)	8	(5)	0.81	0.37	1.76
Grocery vs. American	57	(5)	7	(4)	1.12	0.49	2.52
Hispanic vs. American	179	(17)	34	(20)	0.72	0.47	1.11
Other vs. American	37	(3)	13	(7)	0.39	0.20	0.76
<b>FRANCHISE STATUS</b>							
Chain	709	(67)	80	(46)	2.35	1.70	3.26
Vs. Non-Chain	354	(33)	94	(54)			

#### ANALYSIS: COMPLAINTS AND OUTBREAK INVESTIGATIONS

Due to the complaint data containing two additional variables of interest, model variable effects on the outcome of a complaint being investigated were measured. **Table 5** shows submission method has no effect on outcome of a complaint. It does, however, show a very significant effect of anonymity on whether a complaint will be investigated ( $p < 0.0001$ ). Even though submission method is a poor predictor of whether a complaint will be investigated, complainants submitting a complaint through online methods compared to telephone were 1.4 times as likely to request to remain anonymous (95% CI 1.15-1.78) showing an association between complaint method and complainant anonymity.

**Table 5. COMPLAINTS INVESTIGATED AND NOT INVESTIGATED BY SUBMISSION VARIABLES, KANSAS, 2009-2014**

	Not Investigated (n=1429)		Investigated (n=224)		Odds Ratio	95% Confidence Limits	
	No.	(%)	No.	(%)			
SUBMISSION METHOD							
Telephone	948	(66)	152	(68)	0.93	0.69	1.26
Vs. Online	481	(34)	72	(32)			

<b>ANONYMITY</b>							
<b>Anonymous</b>	468	(33)	28	(13)	3.41	2.26	5.14
<b>Vs. Non-anonymous</b>	961	(67)	196	(88)			

#### FURTHER ANALYSIS OF RELEVANT COMPLAINT AND KFE VARIABLES

Below is a summary of our variables anonymity and franchise status concerning the outcome of a complaint submission. While the ORs are significant, anonymity or franchise status each potentially explain only a small portion of the variability in the complaint submission outcome.

**Table 6. COMPLAINT ANONYMITY AND KFE FRANCHISE STATUS EFFECT ON COMPLAINT SUBMISSION OUTCOME, KANSAS, 2009-2014**

	OR	95% Confidence Limits	
ANONYMITY			
Non-anonymous Complaints	3.44	3.44	2.26
Vs. Anonymous Complaints			
FRANCHISE STATUS			
Non-Chain	2.35	1.70	3.26
Vs. Chain			

#### ANALYSIS: RELEVANT COMPLAINT AND KFE VARIABLES

Due to the numerous reasons an investigation could be labeled “Not an Outbreak” and the singular reason it would be labeled as a confirmed outbreak, variables were reduced to ones that logically applied. This is due to the fact that a “Not an Outbreak” designation potentially does not mean there was no outbreak, but could also show there was a lack of information, were too many common exposures, or the investigation was lost after an inability to reach the complainant. This type of outcome, due mostly to a lack of information, can be biased with any non-information-based variable; since a measure of anonymity is a main indicator of information provided, anonymity was the only variable assessed. The resulting OR of approximately 2.7 was calculated when the “Not an Outbreak” outcome is compared between anonymous and non-anonymous complaints. With a 95% confidence

interval of (1.18, 6.47), there is a significant positive association between anonymous complaints and being ruled as “Not an Outbreak.”

## CH. 4- DISCUSSION

### CONCLUSIONS

Of the approximately 14,000 KFEs holding a license with the KDA from 2009 to 2014, 65% were classified as non-chain and 35% were classified under chain establishments. Under the null hypothesis that complaint and investigation incidence is evenly distributed, we would assume that we would see similar trends for each dependent variable compared to the percentage of KFEs by franchise status. This was not seen, with chain KFEs producing 64% of the complaints while comprising only 35% of the KFE population. We see a reversal of this trend in investigations of complaints per franchise status, with non-chain KFEs producing 54% of the outbreak investigations. We followed this up in the logistic regression model demonstrating non-chain restaurants are more than 2.3 times as likely to produce an investigation. I would propose that an ill Kansan, when considering food history, might be more likely to place the blame on a chain establishment due to number of things. The first of which is that Kansan's may be more likely to frequent chain establishments on a regular basis. Another factor is the increased likelihood of a person knowing employees and owners of small non-chain establishments, likely decreasing the motivation to submit a complaint. Lastly, media can skew public perception of foodborne illness risk by reporting on big foodborne illness outbreaks; since chain restaurants have widespread supply chains and more restaurants are likely to be supplied from singular sources, it makes sense that a chain restaurant is more likely to be forefront in a major foodborne illness investigation.

KFE variables (RAC, Principal Food Type, and Franchise Status) and their effects on complaints showed each with some correlation to the probability of a complaint being produced. The increasing risk of complaints as we move from RAC1 to RAC6 shows that the risk assessment code system is a very good predictor of complaint production, but RAC is not an accurate predictor of outbreak investigations. We also showed that foreign foods and chain restaurants are over represented in the complaints produced but this trend does not apply to outbreak investigations. Generalizing across the counts for each KFE variable and the produced complaints, an increased number of complaints from any category of KFE does not necessarily mean an increase in investigations or outbreaks. I believe that further research into RACs could lead us to a system that better represents outbreak potential and not just perception of illness expressed through complaints. However, since the RAC system is meant to be a measure of how often an establishment will be inspected, it was never really meant to represent outbreak potential; RAC was created to represent the risk of a health code violation. I do believe that the concept of a RAC system, and the basis behind it, could be further expanded to better represent the outbreak potential by including more variables leading to more RAC categories. I am cautious with interpretation of my KFE variable data due to some data discrepancies and potential biases. Towards the end of my internship, I was fortunate to discover that my KFE dataset was missing data points for restaurants I knew existed during the research period. I also noticed foodborne illness outbreak records that did not have a corresponding complaint record within the KDHE's records that I was unable to

correct. I was in contact with the KDA and within the KDHE's systems to identify discrepancies but neither party was able to find the issues. Due to this it is unknown how much data is missing from the KFE lists. Also, the potential for misclassification bias resides in the variables that I created. With over 14,000 KFE's, I, unfortunately, could not visit each one to assure they served "ready-to-eat food" and assess the principal food type and franchise status. Franchise status in itself contains potential bias issues in that my criteria were strict in labeling any KFE with fewer than 3 establishments in Kansas as non-chain and some franchised KFEs that only had one location in Kansas were counted as non-chain establishments.

We see, from the above results, that online complaints are 1.4 times as likely to be submitted anonymously compared to telephone complaints. This could be due to a few different reasons including that online complaints do not put a person in direct contact with a representative, and there is potential to lose some rapport with the individual. Counter to this argument is that anonymity is commonplace on the internet and the desire to remain anonymous is potentially encouraged by internet-based complaints. We also have to look at the other side of this and realize that if a complaint could not be submitted anonymously, we may have individuals who would not bother to submit a complaint at all. When a complaint is submitted by telephone, it allows the representative speaking to the complainant to guide the person in helpful ways such as encouraging all fields to be filled and discouraging anonymity. The effect of submission method on anonymity is compounded when we look at the OR of 2.7 of anonymous complaints resulting in an investigation being declared "Not an Outbreak." Non-outbreaks being investigated has potential to be a waste of time and resources as the outbreak investigation criteria requires investigation but staff have to struggle to contact the complainant. It also carries the potential to result in missing outbreaks happening around the state. Any barrier to the complaint investigation process has the potential to cause an outbreak to be missed and declared "Not an Outbreak;" especially smaller outbreaks. By identifying a greater number of outbreaks, state authorities in Kansas would gain a greater understanding of the foodborne illness burden on Kansas. Anonymity is positively affected by online complaint methods and negatively affects the ability of the KDHE and the KDA to investigate and confirm outbreaks. Our timeline shows that an increasing number of complaints are being submitted anonymously and this appears to also be associated with an increase in online complaints. A point considered during this study was the occurrence of multiple complaints relating to the same outbreak; after looking into the data, this was not a common factor and only 1 instance of it was found in the data.

*\*Shortly before this report was completed, Daniel Neises wrote me regarding the current efforts in anonymity with regards to foodborne illness complaints. The KDA reports being understaffed with regards to answering phone calls on the lodging and food establishment complaint line. They have since added a staff person to help answer these calls. The KDHE is working to create its own web portal to accept foodborne illness complaints. This web portal can be better tailored to meet the needs and information required by the KDHE. The current plan is for two links on the KDA's website; one will lead to the KDHE's forms if the complaint involves illness and the other will lead to the KDA's page for all other complaints. The KDHE has also found the interpretation of the Kansas Open Records Act's statements on redaction to cover illness complaints due to them*

*containing protected private health information. I chose to include the following paragraph due to the points remaining pertinent to all foodborne illness complaint systems.\**

During the writing of this paper, I attempted to call the Kansas Department of Agriculture's Food Safety and Lodging Program twice and was unable to reach a representative either time. The telephone number to file a complaint leads to the following voicemail greeting:

*"Thank you for calling the KDA: Food Safety and Lodging Program. If you would like to file a confidential foodborne illness complaint, please hang up and call the EpiHotline at (877) 427-7317. For all other issues, please leave a detailed message."*

The Food Safety and Lodging Program of the KDA is responsible for public safety through regulation and inspection of KFEs. The KDA collects and organizes KFE complaint information, yet when a constituent calls, they are redirected to the KDHE's hotline. While there is relatively open flow of information between the two Kansas state organizations, they are still two entirely different departments with different staff, goals, and databases. I think that much could be done to simplify this by centralizing the process so that complainants aren't required to make multiple phone calls to be heard. The barriers between someone making an effort to report disease are strong enough without placing more hoops to jump through.

I also have some concern with the current Food Safety and Lodging Program website form and telephone message. As the above analysis shows, complaints submitted by telephone are less likely to be submitted anonymously, and having context information for the complaint improves the ability to investigate outbreaks, yet we run into messages in the complaint process that could be interpreted as encouragement of anonymity and online complaints. The above recording instructs callers to phone the KDHE's EpiHotline which is answered by an answering service, not an epidemiologist. Furthermore, looking at the KDA's online complaint form, a potential complainant is greeted with the following message:

*"Please note that, if you provide it, your name and contact information is subject to the Kansas Open Records Act. All complaints are processed according to program policy. Any information provided on the complaint form will be subject to release even if you request to remain anonymous. Occasionally we have questions about the complaints we investigate, and if we are unable to contact you, it could slow or stop our investigation."*

The Kansas Open Records Act, or "KORA," was created in 1984 before email and technology had changed the way we communicated. The language in KORA does not account for this thus Kansas state departments are saddled with the duty of redaction. Any information deemed inappropriate to be disseminated to the public is the duty of the state department for redaction; cleaning this data of identifying information is just one method of redaction that departments have control over. Through this duty of redaction, a state department can keep personal information of constituents relatively safe. The KDA does well to inform its constituents of their rights to submit anonymously and also warns them about potential information being accessible through public records, but the warnings above could be worded in a way to show how difficult it would be for their identifying information to be accessed in

public records due to this duty of redaction. I feel, in the current state of the USA, citizens feel privacy slowly slipping away. That is why I believe Kansas health authorities must be careful to encourage confidentiality due to constituents sometime overreacting when privacy is brought up. The online page properly states the fact that, through the Kansas Open Records Act, all complaints are subject to be released; this is something that must be done legally, but I feel there are ways to be a bit more tactful with approaching the problem of confidentiality. This could potentially be solved by encouraging telephone complaints so that the KDA representative can better explain the complainant's rights and walk them through the complaint form.

Self-reporting of complaints leads to a potential amount of bias, but there is not a simple way to accumulate information that equals a foodborne illness complaint system in timeliness and ease-of-access by citizens. An effort in the local health departments has been on the rise in Kansas; local health departments are taking the initiative to create their own complaint systems and deal with complaints internally. This is supported by many potential benefits such as a decrease in response time and a complaint system more tailored to the city that supports it, but we lose some regulation and uniformity when we decentralize a surveillance system that depends on the collection of all this data. A final potential bias in this study is the possibility that a complaint that is reported to the county health department does not reach the state level and was never included in the data reviewed. This could be a major factor when estimating the foodborne illness burden on Kansas. A complaint not reaching a state department leaves the KDHE unaware of potential foodborne risk and results in no investigation of the establishment by the KDA. Local health departments should not be discouraged from aiding the collection of foodborne illness complaints, but there should be a system of reporting to ensure that the proper steps are taken for recording and taking action. Complaint systems can greatly reduce the number of barriers between the state's public servants and the people they serve, but only if we ensure the process is centralized and runs cleanly.

## FUTURE RESEARCH

The datasets I used for the project are very large and filled with much more information than could fit in a summer internship. Future research projects on the same data exist for future internships. Of course, incorporating yearly data after 2014 would be another boon to future research in this field. I think that time-sensitive studies dealing with the lag period between exposure, first symptom onset, and complaint reporting would be an interesting way to assess the efficiency of the complaint system in Kansas. One method that both the KDA and the KDHE would benefit from is education of the public regarding the foodborne illness complaint system. Finally, any future research that could track down the elusive data discrepancies I struggled with would be nice to explore.

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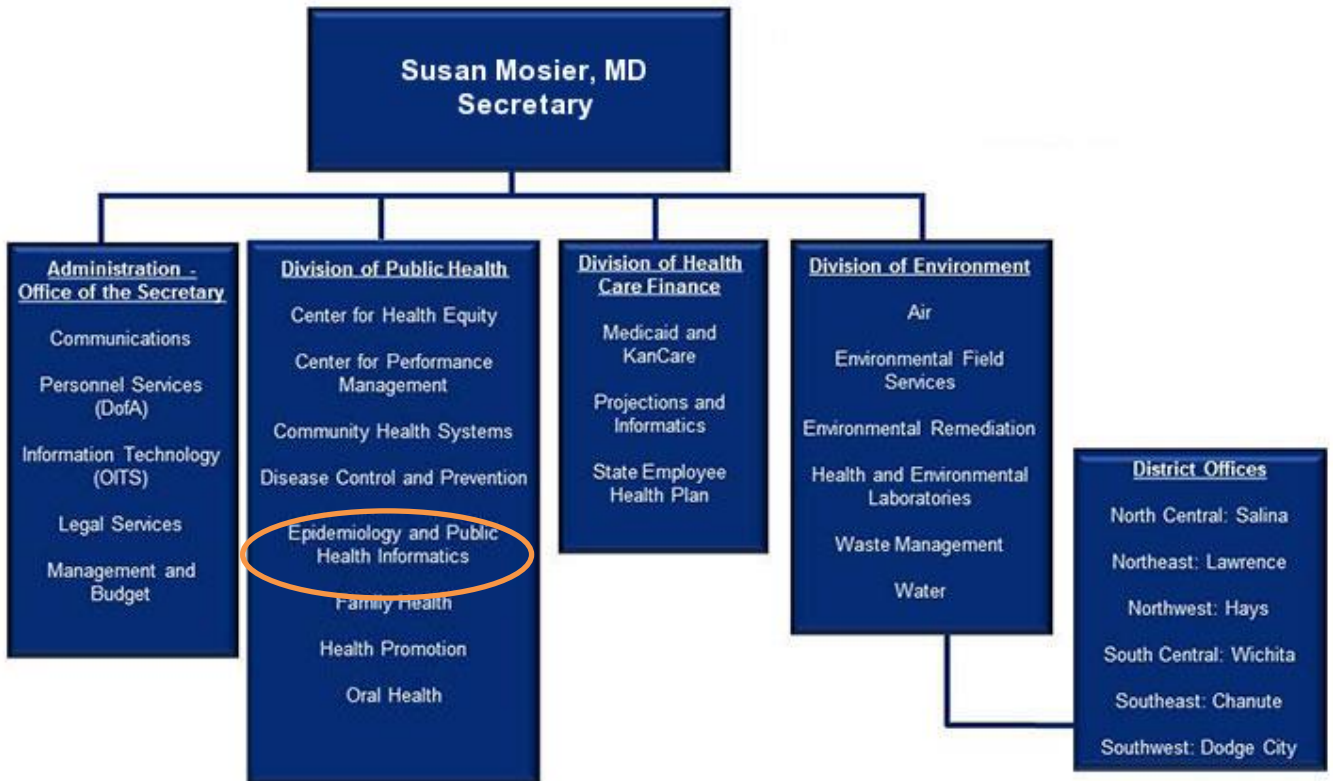
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## APPENDIX





## COMPLAINT INVESTIGATION REPORT

KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT  
BUREAU OF CONSUMER HEALTH  
FOOD SAFETY & CONSUMER PROTECTION



Establishment Name: \_\_\_\_\_ Est ID #: \_\_\_\_\_ Type: \_\_\_\_\_

Date Received: \_\_\_\_\_ Received By: \_\_\_\_\_ Occurrence Date: \_\_\_\_\_ Occurrence Time: \_\_\_\_\_

Complainant: s \_\_\_\_\_ Phone: ( ) \_\_\_\_\_ Email: \_\_\_\_\_

Please check **one** major complaint type:

- ☐ 1 Alleged Foodborne Illness / Outbreak (see below)
- ☐ 2 Personal Health / Hygiene
- ☐ 3 Food Source (sound condition; spoilage; approved)
- ☐ 4 Labeling / Expiration

- ☐ 5 Food Protection (temperatures)
- ☐ 6 Water / Plumbing Sewage
- ☐ 7 General Sanitation
- ☐ 8 Insect, Rodent, Animal
- ☐ 9 Other

### COMPLAINANT'S CONCERN:

#### Alleged Foodborne Illness:

Symptoms (✓ All that Apply): ☐ Vomiting ☐ Diarrhea ☐ Nausea ☐ Abdominal Cramps ☐ Fever ☐ Other \_\_\_\_\_

Date of Illness Onset: \_\_\_\_\_ Time: \_\_\_\_\_ # Persons Ill: \_\_\_\_\_ # Persons Served: \_\_\_\_\_ # Households involved: \_\_\_\_\_

Doctor Visited?: \_\_\_\_\_ Hospitalizations?: \_\_\_\_\_ Stool sample taken?: \_\_\_\_\_ Food samples available?: \_\_\_\_\_

Food/Beverage Eaten: \_\_\_\_\_

Any other commonalities/meals shared?: **N** If yes, which meal(s): \_\_\_\_\_

### INSPECTOR COMMENTS:

Date Worked: \_\_\_\_\_ VALID: \_\_\_\_\_ INVALID: \_\_\_\_\_ UNDETERMINED: \_\_\_\_\_

Date Complainant Notified: \_\_\_\_\_ Via: Letter/email (copy attached) \_\_\_\_\_ Phone \_\_\_\_\_ Other \_\_\_\_\_

ORIGINAL INSPECTION REPORT & COMPLAINT REPORT FORMS TO TOPEKA OFFICE

Bureau of Consumer Health 1000 SW Jackson, Ste 330 Topeka, KS 66612 (785) 296-5600

Revised 11/06

[Home](#) > [Divisions & Programs](#) > [Food Safety and Lodging](#) > Report a Complaint

## Report a Complaint

You may make a complaint about a Kansas Food Establishment, Food Processor, or Lodging Facility by using our one of our online complaint forms below, sending an email to [fsl@kda.ks.gov](mailto:fsl@kda.ks.gov); or by calling us at (785) 564-6767.

[File a Food Safety or Lodging Complaint](#)

[File a Food Safety Complaint Involving Illness](#)

Please note that, if you provide it, your name and contact information is subject to the Kansas Open Records Act. All complaints are processed according to program policy. Any information provided on the complaint form will be subject to release even if you request to remain anonymous.

Occasionally we have questions about the complaints we investigate, and if we are unable to contact you, it could slow or stop our investigation.

To file a confidential Food Safety Complaint involving illness, please call the [Kansas Department of Health and Environment Infectious Disease Epidemiology and Response](#) at (877) 427-7317 or email [EpiHotline@kdheks.gov](mailto:EpiHotline@kdheks.gov).

We work cooperatively with the [Kansas Department of Health and Environment Infectious Disease Epidemiology and Response](#) investigating foodborne illness outbreaks. They provide expertise and technical support to local health departments, the private health care community and the general public. You may contact them at (877) 427-7317 or at [EpiHotline@kdheks.gov](mailto:EpiHotline@kdheks.gov).

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